Standardised Estimates of Fixed Capital Stock

Maddison, Angus

Standardised Estimates of Fixed Capital Stock: A Six Country Comparison

Research Memorandum 570 (GD-9)

Angus Maddison

April 1994

Memorandum from
Institute of Economic Research*
Faculty of Economics
University of Groningen
P.O. Box 800
9700 AV Groningen - The Netherlands
tel. 31-50-633741
fax. 31-50-637337

* Research memoranda of the Groningen Growth and Development Centre are published as a sub-series of the memorandum series of the Institute of Economic Research.

Standardised Estimates of Fixed Capital Stock: A Six Country Comparison*

by

Angus Maddison

(University of Groningen)

Historical and Methodological Background

In the past 50 years, the quantitative study of economic growth has been sharpened and enriched by improved measures of capital stock. When Tinbergen (1942) made his pioneering international comparison of joint factor productivity, he had to cobble together miscellaneous physical indicators of the stock of animals, ships, locomotives, industrial horsepower, dwellings etc., with very crude weights. His "Kapitalmenge" could better be translated as a heap than a stock. For the USA, there was better wealth survey material from censuses going back to 1850, but this too was difficult to aggregate with consistent valuations (Kuznets 1946).

In 1951, Goldsmith pioneered the perpetual inventory method in which the stock estimates for the USA were derived from investment series in constant prices from the national accounts. Here the coverage and valuation methods were more consistent and transparent and much greater information was available on the age structure of assets. Kendrick (1961) used this

* I am grateful to Nanno Mulder and Gjalt de Jong for help in preparing the stock estimates, and to Bart van Ark, Derek Blades, Peter Groote, André Hofman, Dirk Pilat, Eddy Szirmai and Michael Ward for comments on earlier drafts. John C. Musgrave of the US Dept. of Commerce answered many questions on the US official figures, the British and Dutch statistical authorities (CSO and CBS) supplied information on investment and I also received information from official sources in Germany. Hugo Krijnse-Locker of Eurostat supplied the PPPs. An earlier version of this paper (with the same title) appeared in Innovazione e Materie Prime in April 1993. In the earlier version I used the bilateral Paasche PPP at US prices, whereas here I use the more conventional multilateral PPP measure, i.e. Geary Khamis international dollars.

method to produce the capital stock estimates he needed in his study of joint factor productivity for 1889-1957 in the USA. In order to go back so far he had to merge some rough benchmark estimates with a perpetual inventory approach for subsequent years. In the 1970s the US Department of Commerce started to produce comprehensive annual capital stock estimates on a regular basis. These begin with the year 1925 and are based entirely on the perpetual inventory technique. The asset lives the Department uses are generally shorter than those of Kendrick.

In the UK, the pioneer official exercise was Dean (1964) which led to regular official publication of estimates for 1947 onwards. Feinstein (1965, 1972 and 1988) provided an exemplary series of British investment and capital stock estimates which go back much further in time than those for any other country. Kirner (1968) and Lützel (1977) laid the basis for the official German estimates which go back to 1950. The publication of Ward (1976) encouraged the adoption of such measures in other OECD countries (OECD, 1993c).

We now have official capital stock estimates for several countries (Australia, Canada, Germany, the UK, the USA and Scandinavian countries) which are comprehensive in scope and based entirely on the perpetual inventory technique. For a number of other countries there are estimates which resemble those of Kendrick (1961) or Maddison (1972) in that they involve a mix of a base year wealth survey and subsequent use of the perpetual inventory technique (as was the case in Japan), or a rough benchmark based on some assumption about the base year capital-output ratio and subsequent use of the perpetual inventory technique. The OECD secretariat has estimates of "business" capital stocks of this type for 18 countries in its econometric data base which are increasingly used by joint factor productivity analysts (see Kendrick 1993).

The major element of incomparability in the official estimates is that assumptions about the length of life of assets vary more between countries than seems legitimate (see Blades, 1983). It is not easy to measure exactly what these differences are in the aggregate, as the detail is not always publicly available, or is available in different degrees of disaggregation.

In Germany, however, we know that the average life assumed for non-residential structures is 57 years (Schmidt, 1986) whereas it is about 39 years in the USA, and O'Mahony (1993) estimates it to be 66 years in the UK. For machinery and equipment, the German and US official estimates of asset life are similar at 14 years, but O'Mahony (1993) suggests that the average UK life is 25 years. These differing assumptions have a significant effect on the comparative levels and rates of growth exhibited by the official stocks.

It is sometimes argued that the official estimates reflect real inter-country differences in average age of capital. One must concede that this is correct so far as compositional differences are concerned. Within a very broad category such as non-residential structures one country may have a bigger proportion of long-life assets such as roads and canals and the same is true of the broad category machinery and equipment. However, when countries, which, by world standards, are so similar have very different assumptions about virtually identical assets, it seems likely that there is a significant element of incomparability. If the major purpose of stock comparisons is catch-up analysis, i.e. measurement of the distance between the lead country, the USA, and follower countries such as Germany and the UK, it is appropriate to give a zero value to British and German assets which US statisticians would consider to be junk. Conversely it would be legitimate to impute the longer British lives to German and US assets when looking at the world from the UK standpoint.

The major novelty in my standardisation procedure is to assume asset lives which approximate as closely as possible to those in the USA for all six countries under review, i.e. 39 years for non-residential structures and 14 years for machinery and equipment. I also assume that all assets are scrapped when their expected life expires. This (rectangular) assumption makes no allowance for accidents, fire damage etc., but from evidence for countries where alternative retirement patterns have been tested (i.e. France, Germany, the UK and USA) capital stock estimates are not very sensitive to plausible variations in retirement patterns.

I corrected the capital stock estimates for war damage, assuming 3 per cent loss in the UK from the second world war, 8 per cent in France, 10 per cent in the Netherlands, 16 per cent in Germany, and 25.7 per cent in Japan. For France I also assumed 8 per cent war damage in the 1914-18 war. The source of these estimates is indicated in the country notes. For simplicity of calculation, I assumed the impact of the damage to be concentrated on the year 1945. I assumed that war damage affected all of the relevant vintages of capital equally. Thus for non-residential structures, the impact of the second world war on retirements lasted until 1984, and for machinery and equipment until 1959. Most descriptions of official estimates of capital stock make no mention of how or whether war damage is incorporated in the calculations.

My estimates are for mid year. Thus, the stock estimates shown in Tables 7a to 7f are derived by cumulating investment (from Tables 8a to 8f) over the expected life of the relevant asset. For machinery and equipment, gross investment in the 14 years 1978-91 is cumulated to get the end 1991 stock, and the end 1990 stock represents cumulation over the years 1977-90. The mid year 1991 stock shown in Tables 7a to 7f is the average of the end year figures for 1990 and 1991. This holds true in all cases except when war damage was involved.

The estimates include all non-residential structures, machinery, equipment, and vehicles. They exclude land and natural resources, intangibles such as human capital or the stock of knowledge, precious metals, international monetary reserves, foreign assets, increases in inventories, livestock, consumer durables, ancient monuments, works of art and military items.

My estimates are carried back a good deal further than official estimates, i.e. to 1820 for the UK, 1890 for the USA, 1900 and 1925 for Japan, 1935 for Germany, and 1950 for France and the Netherlands. In the case of Japan and the USA, I have linked my perpetual inventory estimates to those of other investigators for earlier years, so that we have a three country comparison for 1890 and a crude binary comparison for the UK and USA for 1820.

In order to enhance intercountry comparability I have shown all the capital stock estimates in 1990 "international" dollars, using the Geary Khamis purchasing power parity (PPP) converters of OECD(1993a), rather than exchange rates. I have also presented the estimates in national currency, so it is relatively easy for the reader to use one of the other PPPs which are available (Paasche, Laspeyres or Fisher).

The major data problem in deriving such estimates is the assembly of the relevant investment series for the two major asset classes in constant prices. Except in the USA, where a more or less complete investment series at 1987 prices was available from the US Dept. of Commerce, the constant price investment series involved linkage of separate segments with different weighting bases which were converted into a single national numeraire, e.g. the UK investment figures were expressed in 1985 prices, but in fact they involve linkage of figures from 1780 to 1851 at 1851-60 prices, 1851-1920 at 1900 prices, 1920-48 at 1938 prices, and 1948-91 at 1985 prices. There is no clear case for preferring the US procedure of a single weighting system for such a long period instead of a linked segment approach. However, the fact that there are differences in the temporal segments between countries does reduce the comparability of the results. Standardisation of the national weighting bases, and testing the sensitivity of the results to such variations is obviously a desirable target for future research. However, it should be stressed that this element of non-comparability in the present standardisation exercise is also a shortcoming of the existing official estimates which are based on similar linkages.

There are some breaks in the historical investment series or inadequate continuity in the price deflators, and for this reason there was some degree of interpolation of investment in war years in France, Japan and the Netherlands as indicated in the country notes. There was also a discrepancy between the Feinstein (1972) and Feinstein (1988) estimates for the link year 1920. Feinstein (1988) estimates 1920 investment in non-residential structures to be about 30 per cent higher and machinery and equipment about 22 per cent higher than Feinstein (1972) (in both cases I have adjusted for the change in geographic coverage for that year). By linking the two estimates I ignored these differences in level. The investment series used by

the CSO in constructing the official capital stock take no cognisance of Feinstein (1972) and (1988), but only of Feinstein (1965).

The advantage of a do-it-yourself approach to estimating capital stock is not only that it corrects for incomparabilities in official stock estimates and permits one to push back the estimates further than the official measures, but it also provides comparable information on the age structure of assets which is not always available from official sources, and it enables one to experiment with and test the sensitivity of the results of alternative assumptions about asset lives and retirement patterns. It is possible to incorporate vintage assumptions about the impact of embodied technical change, to estimate net as well as gross stocks. In the process of making such comparisons, one becomes more intimate with some of the flaws in the existing investment series which would not otherwise be obvious. It is also possible to use the present material with alternative PPP converters to those which I have used.

In view of these advantages, it is not surprising that the practice of standardising capital stock measures has spread rapidly. Approaches similar to mine (which I first developed in Maddison, 1991,) can be found in Hofman (1992), O'Mahony (1992 and 1993) and van Ark (1993). Summers and Heston (1991) incorporated standardised estimates of net stock per worker for 40 countries into their Penn World Tables for the years 1980-88. However, as they have only a short time series for investment, have rather short asset lives and assume very rapid depreciation, their results are not too compatible with mine.

Confrontation of Official and Standardised Estimates in National Currencies

Table 1 compares my results with the official estimates for Germany, the UK, and USA. Such a comparison with the Netherlands is not possible as there are no official estimates for the whole economy. For France and Japan it would be misleading because the official figures exclude all publicly owned assets.

Table 1
Confrontation of Official Estimates of Non-Residential Gross Fixed Capital Stocks and my Standardised Estimates (in National Prices)
(all figures are adjusted to a mid-year basis)

	Standardised Estimate	Official Estimates	Ratio Official/ Standardised
		Germany (billion 1985 DM)	
1950	766.3	1,062.3	139
1973	3,245.1	3,678.6	113
1987	5,159.6	5,729.8	111
		UK (billion 1985 pounds)	
1950	178.7	341.6	191
1973	570.1	745.7	131
1987	870.3	1,055.2	121
		USA (billion 1982 dollars)	
1926	1,952.6	2,055.1	105
1950	2,902.2	2,843.9	98
1973	6,053.2	6,180.4	102
1987	9,535.5	9,332.9	98

Sources: See Maddison (1993). This table is based on an earlier version of the present estimates where the national numeraires were for the years stated.

In 1950 the British official non-residential capital stock levels were 91 per cent higher than my standardised estimate and for Germany they were 39 per cent higher. The differences in level narrow over time, because both Germany and the UK assume declining lives of assets. As a consequence the official British and German estimates show slower growth rates for 1950-73 than the standardised figures.

The official estimates are more finely disaggregated than mine. Germany has 207 different types of non-residential asset (Lützel, 1977, p.65). The UK has four types of non-residential asset whose lives vary across 36 industry divisions (CSO, 1985, p.200). However these compositional differences are not likely to be a major reason for differences between the standardised and the official estimates, because my crude two-way asset breakdown replicates rather closely the US official figures though the latter are disaggregated into 64 kinds of equipment and 32 types of non-residential structures.

Conversion to a Common Numeraire by Use of PPPs rather than Exchange Rates

I converted all the constant price capital stock estimates at national prices into 1990 prices and then converted them into 1990

Table 2(a)

1990 Geary Khamis Purchasing Power Parities and Exchange Rates
(units of national currency per US dollar)

	Machinery & Equipment	Non-Residential Structures	GDP	Exchange Rate
France	9.1100	6.1513	6.4502	5.43
Germany	2.7200	2.09512	2.0518	1.61
Japan	229.230	197.560	185.271	145.00
Netherlands	2.7900	2.4921	2.0840	1.82
UK	0.84622	0.8600	0.58695	0.561
USA	1.00000	1.00000	1.00000	1.00000

Table 2(b)

1990 Price Level Relative to USA
(purchasing power parity divided by exchange rate)

	Investment in Machinery & Equipment	Investment in Non-Residential Structures	Expenditure on GDP
France	1.678	1.133	1.188
Germany	1.689	1.301	1.274
Japan	1.581	1.362	1.278
Netherlands	1.533	1.369	1.145
UK	1.508	1.533	1.046
USA	1.000	1.000	1.000

Source: PPPs and exchange rates derived from OECD (1993a). Non-residential construction is the weighted average for each country of "non-residential construction", and "civil engineering works".

international dollars using the multilateral (Geary Khamis) purchasing power parities (PPPs) as a converter rather than the exchange rate (see Table 2a).

It can be seen from Table 2(b) that the price level for all these expenditure categories was higher in 1990 in the five follower countries than in the USA, and that the price of investment goods was higher than that for GDP as a whole in most cases. In all countries except the UK, the relative price of machinery and equipment was higher than for structures.

Table 3(a)

Level of Total Gross Fixed Non-Residential Capital Stock Per Capita 1820-1991
(in 1990 Geary Khamis $)

	1820	1890	1913	1950	1973	1991
France	n.a.	n.a.	n.a.	8,516	20,075	39,341
Germany	n.a.	n.a.	n.a.	7,754	25,510	44,918
Japan	n.a.	691	1,180	3,337	19,209	55,097
Netherlands	n.a.	n.a.	n.a.	12,403	25,210	37,786
UK	1,201	3,438	4,230	5,535	15,792	27,640
USA	1,222	10,355	17,514	23,321	35,127	51,932

Source: Tables 7a-7f divided by population. US capital stock for 1820 derived from Gallmann (1986 and 1987) as described in the country notes for the USA.

Table 3(b)

Rate of Growth of Total Fixed Non-Residential Capital Stock Per Capita
(annual average compound growth rate, in 1990 Geary Khamis $)

	1820-90	1890-1913	1913-50	1950-73	1973-91
France	n.a.	n.a.	n.a.	3.8	3.8
Germany	n.a.	n.a.	n.a.	5.3	3.2
Japan	n.a.	1.6	2.8	7.9	6.0
Netherlands	n.a.	n.a.	n.a.	3.3	2.3
UK	1.5	0.9	0.7	4.7	3.2
USA	3.1	2.3	0.8	1.8	2.2

Source: Derived from Table 3(a).

Table 4(a)

Ratio of Total Gross Residential Capital Stock to GDP 1820-1991
(in 1990 Geary Khamis $)

	1820	1890	1913	1950	1973	1991
France	n.a.	n.a.	n.a.	1.63	1.55	2.22
Germany	n.a.	n.a.	n.a.	1.81	1.94	2.32
Japan	n.a.	0.71	0.88	1.77	1.74	2.86
Netherlands	n.a.	n.a.	n.a.	2.06	1.98	2.25
UK	0.68	0.84	0.87	0.81	1.32	1.74
USA	0.95	3.05	3.30	2.44	2.12	2.43

Source: Capital stock derived from Tables 7a to 7f, GDP from Maddison (1994).

Some Significant Results

The main purpose of this paper is to provide standardised annual estimates of capital stock as a working tool for analysts of comparative economic performance, catch-up and convergence. However, it is worth highlighting some of the major results which emerge.

(i) We can see in Table 4a that the ratio of the non-residential capital stock to GDP (the capital-output ratio) has not been stable over the long term, and has varied a good deal between countries. In the USA, the capital output ratio peaked in 1913 at a level more than three and a half times that in the UK and Japan. In the postwar period, in which the follower countries made significant headway in catching up on the USA, their capital stock (see Table 3b) grew at unprecedented rates. Their capital output ratios have risen sharply, and are now much closer to that in the USA. Thus the evidence flatly contradicts Kaldor's (1961) assumption, which was widely shared, that the capital output ratio has been steady over long periods in capitalist countries. He asserted (p.178) as a "stylised fact", "the near-identity of the percentage rates of growth of production and of the capital stock".

(ii) In the process of attaining economic leadership in the nineteenth century, the USA achieved a huge advantage over the old leader, the UK, in terms of capital stock per head and capital stock in relation to GDP. Thus our evidence flatly contradicts Field (1983) p.407 when he asserts that the capital-labour and the capital-output ratios "in Britain exceeded their American values by a factor of at least three in midcentury". Thus my estimates throw new light on an old controversy about the roots of US economic growth. It must be added that the margin of error in my calculations for this period is significant, but within the margins which seem likely, there is no possibility that Field's assertion can be correct. Nevertheless, his belief is shared by others, e.g. James and Skinner (1985, p.514), Engerman (in Gallman and Wallis, 1992, p.119) and Broadberry (1993, p.783).

Table 4(b)

Ratio of Gross Stock of Machinery and Equipment to Total Non-Residential Gross Stock (midyear estimates)
(at 1990 relative prices)

	1820	1890	1913	1950	1973	1991
France	n.a.	n.a.	n.a.	0.13	0.32	0.33
Germany	n.a.	n.a.	n.a.	0.22	0.32	0.31
Japan	n.a.	0.14	0.28	0.42	0.33	0.35
Netherlands	n.a.	n.a.	n.a.	0.13	0.31	0.34
UK	0.08	0.14	0.22	0.38	0.39	0.36
USA	0.07	0.15	0.16	0.26	0.31	0.35

Source: Derived from Tables 7a to 7f.

Table 5(a)

Average Age (in years) of Non-Residential Structures at end year

	1890	1913	1950	1973	1991
France	n.a.	n.a.	19.88	12.60	15.40
Germany	n.a.	n.a.	18.85	12.37	16.99
Japan	n.a.	n.a.	14.70	8.78	13.06
Netherlands	n.a.	n.a.	19.78	13.48	17.74[a]
UK	18.29	18.81	18.14	12.57	16.44
USA	14.69	15.05	19.28	14.78	17.59

a) 1990.

Table 5(b)

Average Age (in years) of Machinery and Equipment at end year

	1890	1913	1950	1973	1991
France	n.a.	n.a.	6.32	6.15	6.90
Germany	n.a.	n.a.	8.02	6.61	6.95
Japan	n.a.	5.87	8.40	5.59	6.05
Netherlands	n.a.	n.a.	5.88	6.75	6.76[a]
UK	7.48	7.60	7.25	6.93	6.81
USA	7.20	6.85	6.35	6.48	7.08

a) 1990.
Source: Derived from computer worksheets.

Table 6

Total Gross Non-Residential Capital Stock of the USA and the Five Follower Countries 1950 and 1991
(billion 1990 Geary Khamis dollars)

	1950		1991	
	USA	Five Followers	USA	Five Followers
Machinery and Equipment	930	368	4,622	4,741
Non-Residential Structures	2,621	1,053	8,501	9,364
Total Non-Residential	3,551	1,421	13,123	14,105

Source: Derived from Tables 7a to 7f.

(iii) We can get some clues about the changing composition and age structure of the capital stock which throw some light on possible changes in the rate at which technical change has been embodied in the capital stock. Thus we see over the very long run that the share of machinery and equipment in the total stock has risen (Table 4b). As there is reason to think that technical progress may be faster in machinery and equipment than in structures, this may help explain why productivity growth has been faster in the twentieth century than in the nineteenth. However, it should be noted that the equipment share has not risen monotonically. We can also see that the average age of the capital stock fell in the follower countries in the postwar golden age. The accelerated growth of capital stock led to a larger share for the newer vintages of capital. When economic growth slowed down after 1973, the average age of capital rose in virtually all cases (Tables 5a and 5b).

(iv) We can also get some idea of the changing geographic locus of the technological frontier. Table 6 compares the level of the aggregate non-residential capital stock in the USA and the five follower countries. In 1950 the total stock in the five follower countries was only two fifths of that in the USA, whereas in 1991 it was bigger. Technological progress depends to an important extent on the scope which engineers, entrepreneurs and managers have to test out new ideas by embodying them in the capital stock. In the past the scope in this respect for Americans was clearly bigger than in the follower countries. Now the followers have a relatively

greater scope for experimentation and learning-from-doing. This means that the sources of technological progress have become more widely diffused, all the more so as the ease of transnational communication between the follower countries has improved dramatically in the past half century.

Country Source Notes

France: 1910-38 investment in structures and 1935-38 in equipment from Carré, Dubois and Malinvaud (1972), p.652, with interpolation where necessary for 1913-22. 1938-50 investment from Maddison (1972) assuming both types of investment to move parallel; 1950-68 from OECD (1970) at 1963 prices, linked to 1968-75 at 1970 prices; 1975-91 at 1980 prices from subsequent issues of the same OECD publication. 8 per cent war damage was assumed for each of the two world wars: see Présidence du Conseil (1948-51).

Germany: 1950-91 investment at 1985 prices from Federal Statistical Office (1991) and OECD national accounts, linked to earlier years at 1954 prices from Kirner (1968) pp.103-5 for non-residential structures (back to 1850) and pp.106-7 for equipment (partial from 1900, complete from 1930). Kirner estimated war damage to be about 16 per cent. The official capital stock estimates quoted in Table 1 above for 1960-87 are from the Federal Statistical Office (1991) linked to earlier official estimates for 1950-60. The official estimates of capital stock are based on the same investment series I used for 1950 onwards. For earlier years the statistical office also used Kirner's estimates but made some adjustments based on postwar wealth surveys. The detail of these adjustments is not in the public domain.

Japan: 1885-1940 investment by type of asset at 1934-6 prices from Ohkawa and Shinohara (1979) p.357-61. 1940-52 total non-residential investment at 1934-6 prices (adjusted to a calendar year basis) from Ohkawa and Rosovsky (1973) pp.292-3. 1945 gross investment was missing and was assumed to be half of that 1944. This source does not show a breakdown of non-residential investment by type of asset at constant prices, so 1941-5 machinery and

equipment investment was assumed to be the same proportion of total non-residential fixed investment as in 1940 and for 1946-51 it was assumed to be the same proportion of the total as in 1952. 1952-70 investment by type of asset at current prices from EPA (Economic Planning Agency) (1969) and EPA (1975) adjusted to a calendar year basis. EPA does not provide deflators for 1952-70, so I deflated each type of asset by the overall deflator (in 1965 prices) for non-residential investment which is implicit in Ohkawa and Shinohara (1979) pp.363 and 365. 1970-91 investment in 1985 prices from EPA (1990 and 1991) and OECD National accounts. The volume movements for earlier years were linked at 1970. War damage was taken to be 25.7 per cent of pre-1946 investment see Bank of Japan (1966), p.27. As a proxy for the 1890-1924 stock of non-residential structures, and for the 1890-9 stock of machinery and equipment I used the stock estimates in Ohkawa and Shinohara, pp.366-7 to link with my perpetual inventory estimates.

Netherlands: Gross investment 1921-39 and 1948-90 at 1980 prices by type of asset was supplied by CBS. 1910-21 and 1939-48 figures were not available from CBS and as a proxy I assumed both types of asset to move parallel to machinery and equipment investment by enterprises at 1970 prices from Appendix 7.2 of den Hartog and Tjan (1979). This source puts war damage at 35 per cent, probably based on the official (Memorandum, 1945) estimates made to back claims for reparations. However, this is well out of line with Kirner's estimate of 16 per cent war damage for Germany. Van Zanden and Griffiths (1989) p.185-7 acknowledge the overestimate of war damage in the official sources, which apart from being exaggerated for bargaining purposes, also included disinvestment and a very large estimate for inventory losses. I assumed Dutch war damage to have been 10 per cent of pre-1946 investment, i.e. significantly less than in Germany. The Netherlands does not yet have a comprehensive official estimate of capital stock. So far estimates have been prepared for agriculture, mining, manufacturing and dwellings, see CBS (1991).

United Kingdom: Annual estimates of fixed investment at 1985 prices for 1948 to 1991 were provided by the Central Statistical Office. These were linked to 1920-48 estimates in 1938 prices from Feinstein (1972). These were, in their turn, linked backward to the movement shown for 1780-1920 in

Feinstein (1988), pp.446-7. For 1851-1920 they are at 1900 prices and include the whole of Ireland. For 1780-1851 they exclude Ireland and are at 1851-60 prices; for this period I had to unscramble Feinstein's decade averages, prorating growth between the decade midpoints to get rough annual figures. I assumed war damage to be 3 per cent of pre-1946 investment. Hancock and Gowing (1949), p.551 give a figure of 10 per cent for physical destruction and domestic disinvestment. but I have excluded the latter, as its effects are already contained in our accumulation accounts.

United States: United States official (US Dept. of Commerce, 1993) capital stock figures start with the year 1925, and the official investment figures were assembled with this date in mind. Hence there are zero entries for several kinds of investment for early years as these were not necessary for the official purpose. As my annual estimates of capital stock start in 1890, I had to make a rough estimate for investment missing in the official figures, i.e. 1850-93 for private non-residential structures and 1875-97 for private investment in equipment. Detailed figures for 22 types of equipment, 6 types of non-residential building and eight other types of structure are given by the Dept. of Commerce. For the missing categories, I simply assumed that investment in the earlier years with a zero entry was the same as in the year for which the first entry was available (excluding items such as autos and aircraft where such an assumption would have been anachronistic). The missing items were particularly large for equipment in the early years and not negligible for structures. In Table 3 I have included a rough estimate for US capital stock per capita in 1820. The link 1820-90 was derived from volume movements shown in Gallman (1986 and 1987). Gallman (1987) gives alternative perpetual inventory estimates of gross stock for 1840-90. I selected the option where his asset life assumptions were nearest to mine. The 1820-40 movement I derived from the wealth survey estimates in Gallman (1986). The 1820 figure for the gross stock of non-residential structures was 10,876 million 1990 dollars, for machinery and equipment 873 million.

References

Bank of Japan, Hundred Year Statistics of the Japanese Economy, Tokyo, 1966.

Blades, D., "Service Lives of Fixed Assets", ESD Working Papers, No.4, OECD, Paris, 1983.

Broadberry, S.N., "Manufacturing and the Convergence Hypothesis: What the Long Run Data Show, Journal of Economic History, December 1993.

Carré, J.-J., P. Dubois, and E. Malinvaud, La croissance française, Seuil, Paris, 1972.

CBS, Kapitaalgoederenvoorraad 1990, The Hague, 1991.

CSO, UK National Accounts: Sources and Methods, HMSO, London, 1985.

Dean, G., "The Stock of Fixed Capital in the United Kingdom in 1961", Journal of the Royal Statistical Society, Series A, vol. 127(3), 1964.

Den Hartog, H., and T.S. Tjan, "A Clay-Clay Vintage Model Approach for Sectors of Industry in the Netherlands", Central Planning Bureau, The Hague, September 1979.

Economic Planning Agency, Revised Report on National Income Statistics 1951-1967, Tokyo, 1969.

Economic Planning Agency, Annual Report on National Income Statistics, Tokyo, 1975.

Economic Planning Agency, Revised Accounts on the Basis of 1985, Tokyo, October 1990.

Economic Planning Agency, Annual Report on National Accounts, Tokyo, 1991.

Federal Statistical Office, Volkswirtschaftliche Gesamtrechnungen, Fachserie 18, Reihe S. 15, Revidierte Ergebnisse 1950 bis 1990, Wiesbaden, 1991.

Feinstein, C.H., Domestic Capital Formation in the United Kingdom 1920-1938, Cambridge University Press, 1965.

Feinstein, C.H., National Income, Expenditure and Output of the United Kingdom 1855-1965, Cambridge University Press, 1972.

Feinstein, C.H. and S. Pollard, eds., Studies in Capital Formation in the United Kingdom 1750-1920, Oxford University Press, 1988.

Field, A.J., "Land Abundance, Interest/Profit Rates, and Nineteenth-Century American and British Technology", Journal of Economic History, June 1983.

Gallman, R.E., "The United States Capital Stock in the Nineteenth Century", in S.L. Engerman and R.E. Gallman, eds., Long Term Factors in American Economic Growth, University of Chicago, 1986.

Gallman, R.E., "Investment Flows and Capital Stocks: US Experience in the Nineteenth Century", in P. Kilby, ed., Quantity and Quiddity: Essays in US Economic History, Wesleyan University Press, Middletown, 1987.

Gallman, R.E. and Wallis, J.J., American Economic Growth and Standards of Living Before the Civil War, NBER, University of Chicago, 1992.

Goldsmith, R.W., "A Perpetual Inventory of National Wealth", in M.R. Gainsburgh, Studies in Income and Wealth, Vol.14, Princeton, 1951.

Hancock, W.K. and M.M. Gowing, British War Economy, London, 1949.

Hofman, André A, "Capital Accumulation in Latin America: A Six Country Comparison for 1950-89", Review of Income and Wealth, December 1992.

IMF, International Financial Statistics, various issues.

James, J.A., and J.S. Skinner, "The Resolution of the Labor-Scarcity Paradox", Journal of Economic History, September 1985.

Kaldor, N. "Capital Accumulation and Economic Growth", in F.A. Lutz and D. Hague, eds., The Theory of Capital, Macmillan, London, 1961.

Kendrick, J., Productivity Trends in the United States, Princeton, 1961.

Kendrick, J., "How Much Does Capital Explain?", in A. Szirmai, B. van Ark, and D. Pilat, eds., Explaining Economic Growth: Essays in Honour of Angus Maddison, Elsevier, North Holland, Amsterdam, 1993.

Kirner, W., Zeitreihen für das Anlagevermögen der Wirtschaftbereiche in der Bundesrepublik Deutschland, Duncker and Humblot, Berlin, 1968.

Kuznets, S., National Product since 1869, NBER, New York, 1946.

Lützel, H., "Estimates of Capital Stock by Industries in the Federal Republic of Germany", Review of Income and Wealth, March 1977.

Maddison, A., "Explaining Economic Growth", Banca Nazionale del Lavoro Quarterly Review, September 1972.

Maddison, A., Dynamic Forces in Capitalist Development, Oxford University Press, 1991.

Maddison, A., "A Long Run Perspective on Saving", Scandinavian Journal of Economics, June 1992.

Maddison, A., "Standardised Estimates of Fixed Capital Stock: A Six Country Comparison", Innovazione e Materie prime, Milan, April 1993.

Maddison, A., Monitoring the World Economy 1820-1992, OECD Development Centre, Paris, 1994.

Memorandum van de Nederlandsche Regeering inzake de door Nederland van Duitschland te eischen schadevergoeding, The Hague, 1945.

OECD, National Accounts 1950-1968, Paris, 1970.

Table 7b

Germany: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(million 1990 DM)			(million 1990 Geary-Khamis $)		
1935	734,348	188,705	923,053	350,504	69,377	419,881
1936	743,947	189,326	933,273	355,085	69,605	424,691
1937	755,693	193,210	948,903	360,692	71,033	431,725
1938	770,691	201,344	972,035	367,851	74,024	441,874
1939	787,647	210,905	998,552	375,944	77,539	453,482
1940	800,214	220,057	1,020,271	381,942	80,903	462,845
1941	805,740	227,881	1,033,620	384,579	83,780	468,359
1942	803,308	233,982	1,037,290	383,419	86,023	469,441
1943	792,604	238,953	1,031,557	378,310	87,850	466,160
1944	776,438	241,198	1,017,636	370,593	88,676	459,269
1945	705,791	223,019	928,809	336,874	81,992	418,866
1946	638,366	205,068	843,435	304,692	75,393	380,085
1947	629,819	205,896	835,716	300,613	75,697	376,310
1948	628,513	208,794	837,307	299,989	76,762	376,751
1949	631,806	216,354	848,161	301,561	79,542	381,103
1950	636,897	227,275	864,171	303,990	83,557	387,547
1951	643,833	238,623	882,456	307,301	87,729	395,031
1952	654,816	249,546	904,362	312,544	91,745	404,288
1953	673,244	260,913	934,158	321,339	95,924	417,263
1954	699,498	276,204	975,702	333,870	101,546	435,416
1955	735,658	299,132	1,034,791	351,129	109,975	461,105
1956	782,158	328,204	1,110,362	373,324	120,663	493,987
1957	835,260	359,417	1,194,677	398,669	132,139	530,808
1958	892,378	395,754	1,288,131	425,932	145,498	571,429
1959	953,070	443,002	1,396,072	454,900	162,868	617,768
1960	1,017,471	501,082	1,518,553	485,639	184,221	669,860
1961	1,084,974	566,667	1,651,641	517,858	208,333	726,191
1962	1,158,329	634,482	1,792,811	552,870	233,265	786,136
1963	1,237,804	697,675	1,935,479	590,803	256,498	847,301
1964	1,325,145	758,870	2,084,014	632,491	278,996	911,487
1965	1,419,506	823,994	2,243,500	677,530	302,939	980,469
1966	1,513,845	889,428	2,403,273	722,558	326,995	1,049,553
1967	1,600,905	947,603	2,548,509	764,112	348,384	1,112,495
1968	1,684,485	1,000,472	2,684,956	804,004	367,821	1,171,824
1969	1,778,674	1,058,341	2,837,016	848,961	389,096	1,238,057
1970	1,889,817	1,128,665	3,018,482	902,009	414,951	1,316,959
1971	2,014,251	1,210,153	3,224,404	961,401	444,909	1,406,310
1972	2,140,189	1,292,128	3,432,317	1,021,511	475,047	1,496,558
1973	2,258,880	1,367,667	3,626,548	1,078,163	502,819	1,580,982
1974	2,369,407	1,427,749	3,797,156	1,130,917	524,908	1,655,825
1975	2,471,623	1,471,674	3,943,297	1,179,705	541,057	1,720,761
1976	2,568,015	1,512,344	4,080,359	1,225,713	556,009	1,781,722
1977	2,660,538	1,558,586	4,219,124	1,269,874	573,010	1,842,883
1978	2,752,242	1,611,539	4,363,781	1,313,644	592,477	1,906,122
1979	2,852,551	1,669,482	4,522,033	1,361,522	613,780	1,975,302
1980	2,962,310	1,733,348	4,695,658	1,413,910	637,260	2,051,170
1981	3,073,801	1,800,345	4,874,146	1,467,124	661,892	2,129,015
1982	3,184,163	1,859,103	5,043,266	1,519,800	683,494	2,203,294
1983	3,295,424	1,903,981	5,199,405	1,572,905	699,993	2,272,898
1984	3,408,006	1,934,074	5,342,080	1,626,640	711,057	2,337,697
1985	3,519,064	1,958,633	5,477,697	1,679,648	720,086	2,399,734
1986	3,630,739	1,992,161	5,622,900	1,732,950	732,412	2,465,362
1987	3,742,241	2,035,239	5,777,480	1,786,170	748,250	2,534,420
1988	3,848,860	2,095,664	5,944,524	1,837,059	770,465	2,607,524
1989	3,953,250	2,177,543	6,130,793	1,886,885	800,567	2,687,452
1990	4,059,255	2,277,851	6,337,106	1,937,481	837,445	2,774,926
1991	4,168,681	2,393,748	6,562,428	1,989,710	880,054	2,869,764

Table 7c
Japan: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(Billion 1990 Yen)			(Million 1990 Geary-Khamis $)		
1890	5,448 *	779 *	6,228	23,767 *	3,946 *	27,712
1891	5,480 *	814 *	6,294	23,907 *	4,122 *	28,028
1892	5,606 *	842 *	6,448	24,455 *	4,261 *	28,716
1893	5,656 *	882 *	6,539	24,676 *	4,465 *	29,141
1894	5,787 *	970 *	6,757	25,246 *	4,910 *	30,156
1895	5,925 *	1,046 *	6,971	25,849 *	5,295 *	31,143
1896	6,168 *	1,132 *	7,300	26,908 *	5,731 *	32,639
1897	6,417 *	1,271 *	7,689	27,995 *	6,435 *	34,430
1898	6,521 *	1,426 *	7,947	28,447 *	7,219 *	35,666
1899	6,648 *	1,520 *	8,167	29,001 *	7,692 *	36,693
1900	6,802 *	1,639	8,441	29,674 *	8,294	37,968
1901	6,918 *	1,713	8,631	30,179 *	8,671	38,850
1902	7,061 *	1,759	8,820	30,803 *	8,901	39,705
1903	7,174 *	1,795	8,970	31,298 *	9,087	40,385
1904	7,267 *	1,857	9,124	31,702 *	9,400	41,102
1905	7,426 *	1,978	9,404	32,396 *	10,014	42,410
1906	7,654 *	2,144	9,798	33,391 *	10,851	44,242
1907	7,971 *	2,302	10,273	34,773 *	11,654	46,427
1908	8,251 *	2,461	10,712	35,994 *	12,456	48,450
1909	8,584 *	2,605	11,189	37,447 *	13,187	50,634
1910	8,921 *	2,724	11,645	38,916 *	13,789	52,705
1911	9,319 *	2,871	12,190	40,653 *	14,530	55,184
1912	9,741 *	3,076	12,816	42,493 *	15,568	58,061
1913	10,088 *	3,354	13,443	44,010 *	16,979	60,989
1914	10,399 *	3,659	14,058	45,366 *	18,522	63,888
1915	10,709 *	3,920	14,628	46,716 *	19,840	66,556
1916	10,984 *	4,226	15,210	47,916 *	21,392	69,308
1917	11,329 *	4,739	16,068	49,422 *	23,987	73,409
1918	11,638 *	5,549	17,188	50,772 *	28,089	78,861
1919	12,038 *	6,505	18,543	52,515 *	32,928	85,443
1920	12,615 *	7,458	20,073	55,033 *	37,748	92,781
1921	13,123 *	8,272	21,395	57,249 *	41,872	99,121
1922	13,751 *	8,821	22,571	59,987 *	44,648	104,635
1923	14,301 *	9,188	23,489	62,386 *	46,506	108,892
1924	14,855 *	9,503	24,358	64,802 *	48,103	112,905
1925	15,580	9,784	25,364	67,968	49,524	117,492
1926	16,706	10,022	26,728	72,878	50,731	123,609
1927	17,932	10,271	28,203	78,227	51,989	130,217
1928	19,119	10,557	29,676	83,404	53,438	136,842
1929	20,268	10,934	31,201	88,416	55,344	143,760
1930	21,406	11,317	32,722	93,380	57,282	150,662
1931	22,484	11,396	33,880	98,083	57,684	155,767
1932	23,489	11,058	34,546	102,467	55,972	158,439
1933	24,475	10,593	35,068	106,772	53,617	160,389
1934	25,536	10,313	35,849	111,399	52,201	163,600
1935	26,730	10,417	37,147	116,606	52,730	169,337
1936	27,984	10,932	38,917	122,080	55,337	177,417
1937	29,228	11,712	40,940	127,507	59,282	186,789
1938	30,507	12,835	43,342	133,085	64,967	198,052
1939	31,912	14,597	46,509	139,214	73,887	213,102
1940	33,113	16,923	50,036	144,452	85,659	230,111
1941	34,027	19,488	53,516	148,441	98,646	247,086
1942	34,891	21,916	56,807	152,212	110,932	263,144
1943	35,823	24,398	60,221	156,275	123,496	279,771
1944	36,891	27,181	64,072	160,933	137,584	298,518
1945	32,732	25,371	58,103	142,791	128,423	271,214
1946	28,863	22,279	51,143	125,914	112,773	238,686
1947	30,777	22,591	53,368	134,264	114,349	248,613
1948	33,031	22,868	55,899	144,094	115,752	259,846
1949	35,205	22,956	58,162	153,581	116,198	269,779

Table 7c (cont.)
Japan: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(Billion 1990 Yen)			(Million 1990 Geary-Khamis $)		
1950	36,957	22,800	59,757	161,223	115,409	276,632
1951	38,644	22,548	61,192	168,583	114,131	282,714
1952	40,774	22,219	62,993	177,874	112,466	290,340
1953	43,459	21,648	65,107	189,586	109,578	299,164
1954	46,606	20,806	67,412	203,314	105,315	308,630
1955	50,024	19,753	69,777	218,224	99,985	318,209
1956	53,879	18,952	72,831	235,043	95,928	330,972
1957	58,275	18,468	76,743	254,220	93,482	347,702
1958	63,027	18,088	81,115	274,949	91,559	366,508
1959	68,254	18,702	86,956	297,753	94,665	392,418
1960	74,578	21,030	95,607	325,340	106,446	431,786
1961	82,736	24,596	107,331	360,928	124,498	485,427
1962	92,646	28,843	121,489	404,161	145,999	550,160
1963	103,717	33,667	137,384	452,457	170,414	622,871
1964	115,877	39,282	155,159	505,505	198,837	704,342
1965	128,596	45,396	173,992	560,990	229,782	790,772
1966	141,985	51,804	193,788	619,398	262,217	881,614
1967	159,598	59,103	218,701	696,235	299,163	995,398
1968	180,120	68,336	248,456	785,762	345,899	1,131,661
1969	201,798	80,182	281,980	880,330	405,861	1,286,191
1970	227,175	93,859	321,034	991,034	475,090	1,466,124
1971	255,323	107,932	363,255	1,113,831	546,324	1,660,155
1972	285,533	122,250	407,783	1,245,617	618,798	1,864,415
1973	318,282	138,051	456,332	1,388,481	698,778	2,087,259
1974	351,335	153,382	504,716	1,532,674	776,379	2,309,054
1975	383,573	166,007	549,580	1,673,312	840,286	2,513,597
1976	415,859	177,587	593,446	1,814,156	898,899	2,713,056
1977	448,472	189,364	637,836	1,956,429	958,513	2,914,941
1978	482,783	201,713	684,496	2,106,106	1,021,024	3,127,130
1979	519,867	215,624	735,492	2,267,885	1,091,437	3,359,322
1980	559,105	230,567	789,671	2,439,055	1,167,072	3,606,127
1981	599,302	245,440	844,741	2,614,412	1,242,354	3,856,766
1982	639,348	259,387	898,734	2,789,110	1,312,951	4,102,061
1983	678,353	271,594	949,947	2,959,266	1,374,742	4,334,008
1984	717,221	284,058	1,001,279	3,128,826	1,437,830	4,566,656
1985	756,014	299,219	1,055,233	3,298,060	1,514,571	4,812,631
1986	794,599	316,413	1,111,012	3,466,384	1,601,603	5,067,987
1987	834,174	334,477	1,168,651	3,639,027	1,693,039	5,332,066
1988	876,103	357,288	1,233,391	3,821,937	1,808,504	5,630,441
1989	921,812	388,148	1,309,960	4,021,341	1,964,712	5,986,053
1990	971,241	425,531	1,396,773	4,236,974	2,153,935	6,390,909
1991	1,023,677	466,623	1,490,301	4,465,722	2,361,932	6,827,654

* these figures are not derived by the perpetual inventory method, but are estimates derived from Ohkawa and Shinohara (1979), pp. 366-8.

Table 7d
Netherlands: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(million 1990 guilders)			(million 1990 Geary-Khamis $)		
1950	263,733	44,580	308,313	105,827	15,978	121,806
1951	269,258	48,550	317,808	108,045	17,401	125,446
1952	274,016	51,229	325,245	109,954	18,362	128,316
1953	279,995	53,727	333,722	112,353	19,257	131,610
1954	287,183	58,594	345,777	115,237	21,002	136,239
1955	294,663	66,761	361,424	118,239	23,929	142,168
1956	303,208	77,588	380,795	121,668	27,809	149,477
1957	312,144	90,240	402,383	125,253	32,344	157,597
1958	320,342	102,420	422,762	128,543	36,710	165,253
1959	328,415	114,289	442,704	131,783	40,964	172,746
1960	337,878	126,920	464,797	135,580	45,491	181,070
1961	348,995	138,892	487,887	140,040	49,782	189,823
1962	361,778	150,007	511,785	145,170	53,766	198,936
1963	375,540	160,784	536,324	150,692	57,629	208,321
1964	392,077	171,506	563,583	157,328	61,472	218,800
1965	410,523	183,161	593,683	164,730	65,649	230,379
1966	429,182	196,807	625,990	172,217	70,540	242,757
1967	449,631	211,564	661,194	180,422	75,829	256,252
1968	472,183	226,675	698,859	189,472	81,246	270,718
1969	494,526	240,369	734,895	198,437	86,154	284,591
1970	516,102	252,994	769,096	207,095	90,679	297,774
1971	539,127	265,589	804,716	216,334	95,193	311,527
1972	561,840	278,266	840,107	225,449	99,737	325,186
1973	582,585	293,024	875,609	233,773	105,027	338,799
1974	602,393	308,348	910,741	241,721	110,519	352,240
1975	622,298	321,539	943,837	249,708	115,247	364,955
1976	642,499	331,693	974,192	257,814	118,886	376,701
1977	661,755	342,379	1,004,134	265,541	122,716	388,258
1978	680,117	355,125	1,035,242	272,909	127,285	400,194
1979	700,355	367,810	1,068,164	281,030	131,831	412,861
1980	723,456	378,571	1,102,026	290,300	135,688	425,988
1981	746,730	385,621	1,132,352	299,639	138,216	437,855
1982	768,529	389,314	1,157,843	308,386	139,539	447,925
1983	789,819	393,822	1,183,640	316,929	141,155	458,084
1984	811,698	400,261	1,211,959	325,709	143,463	469,171
1985	832,984	411,815	1,244,799	334,250	147,604	481,854
1986	851,760	430,954	1,282,714	341,784	154,464	496,248
1987	868,302	450,692	1,318,994	348,422	161,538	509,960
1988	884,933	467,732	1,352,664	355,095	167,646	522,741
1989	902,782	486,441	1,389,223	362,257	174,352	536,609
1990	921,382	510,187	1,431,569	369,721	182,863	552,584
1991	941,235	534,981	1,476,215	377,687	191,749	569,437
1992	960,562	557,846	1,518,408	385,443	199,945	585,388

Table 7e
UK: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(Million 1990 Pounds)			(million 1990 Geary-Khamis $)		
1820	18,546	1,633	20,178	21,916	1,899	23,814
1821	18,847	1,665	20,512	22,272	1,936	24,208
1822	19,147	1,701	20,848	22,627	1,978	24,605
1823	19,455	1,741	21,196	22,990	2,025	25,015
1824	19,768	1,785	21,553	23,360	2,076	25,436
1825	20,087	1,834	21,921	23,738	2,132	25,870
1826	20,415	1,888	22,302	24,124	2,195	26,319
1827	20,756	1,946	22,702	24,528	2,263	26,791
1828	21,117	2,009	23,126	24,955	2,336	27,291
1829	21,499	2,078	23,577	25,406	2,416	27,822
1830	21,895	2,152	24,046	25,873	2,502	28,375
1831	22,308	2,230	24,538	26,362	2,593	28,955
1832	22,749	2,312	25,061	26,883	2,689	29,572
1833	23,214	2,398	25,612	27,433	2,788	30,221
1834	23,705	2,488	26,192	28,012	2,893	30,905
1835	24,224	2,581	26,805	28,626	3,001	31,627
1836	24,781	2,677	27,458	29,284	3,113	32,397
1837	25,384	2,777	28,161	29,997	3,229	33,226
1838	26,039	2,880	28,919	30,771	3,349	34,120
1839	26,749	2,988	29,737	31,610	3,474	35,084
1840	27,523	3,100	30,623	32,525	3,604	36,130
1841	28,440	3,214	31,654	33,609	3,737	37,345
1842	29,500	3,329	32,829	34,860	3,871	38,732
1843	30,634	3,448	34,083	36,202	4,010	40,211
1844	31,849	3,571	35,420	37,637	4,152	41,789
1845	33,147	3,697	36,844	39,171	4,299	43,470
1846	34,499	3,828	38,327	40,769	4,451	45,219
1847	35,843	3,964	39,807	42,356	4,609	46,965
1848	37,146	4,107	41,253	43,896	4,776	48,672
1849	38,408	4,258	42,666	45,388	4,951	50,339
1850	39,630	4,416	44,047	46,832	5,135	51,967
1851	40,744	4,586	45,330	48,148	5,333	53,481
1852	41,791	4,769	46,560	49,385	5,546	54,931
1853	42,807	4,973	47,780	50,586	5,782	56,368
1854	43,797	5,239	49,037	51,756	6,092	57,849
1855	44,802	5,552	50,354	52,943	6,456	59,399
1856	45,747	5,807	51,554	54,061	6,752	60,813
1857	46,671	5,971	52,642	55,152	6,943	62,095
1858	47,619	6,085	53,704	56,272	7,076	63,348
1859	48,650	6,188	54,838	57,491	7,196	64,687
1860	49,784	6,335	56,119	58,831	7,366	66,197
1861	51,042	6,532	57,574	60,317	7,596	67,913
1862	52,415	6,764	59,179	61,940	7,866	69,805
1863	53,898	7,070	60,968	63,692	8,221	71,913
1864	55,496	7,484	62,980	65,581	8,702	74,284
1865	57,234	7,941	65,175	67,635	9,234	76,869
1866	59,009	8,346	67,355	69,733	9,704	79,437
1867	60,543	8,642	69,184	71,545	10,048	81,593
1868	61,821	8,797	70,618	73,055	10,230	83,284
1869	62,957	8,880	71,837	74,398	10,325	84,723
1870	64,082	9,064	73,145	75,727	10,539	86,266
1871	65,336	9,443	74,780	77,210	10,981	88,191
1872	66,754	9,950	76,704	78,885	11,570	90,455
1873	68,267	10,447	78,714	80,673	12,148	92,820
1874	69,956	10,913	80,869	82,669	12,689	95,358
1875	71,793	11,372	83,165	84,840	13,223	98,062
1876	73,635	11,788	85,423	87,016	13,707	100,723
1877	75,451	12,152	87,603	89,163	14,130	103,292
1878	77,184	12,364	89,548	91,210	14,377	105,587
1879	78,752	12,453	91,205	93,064	14,480	107,543

Table 7e (cont.)
UK: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(Million 1990 Pounds)			(million 1990 Geary-Khamis $)		
1880	80,020	12,558	92,578	94,562	14,602	109,164
1881	81,100	12,788	93,888	95,838	14,869	110,707
1882	82,078	13,147	95,224	96,993	15,287	112,280
1883	82,909	13,606	96,515	97,976	15,821	113,797
1884	83,785	13,979	97,764	99,011	16,255	115,266
1885	84,600	14,126	98,727	99,974	16,426	116,401
1886	85,202	14,102	99,304	100,686	16,398	117,084
1887	85,748	14,048	99,796	101,331	16,334	117,665
1888	86,302	14,067	100,368	101,985	16,356	118,342
1889	86,897	14,179	101,075	102,688	16,487	119,175
1890	87,666	14,385	102,051	103,597	16,727	120,324
1891	88,599	14,606	103,205	104,700	16,984	121,683
1892	89,616	14,900	104,516	105,901	17,325	123,227
1893	90,710	15,247	105,957	107,194	17,729	124,923
1894	91,862	15,619	107,481	108,556	18,161	126,718
1895	93,163	16,019	109,182	110,094	18,627	128,720
1896	94,602	16,458	111,060	111,794	19,137	130,931
1897	96,220	16,962	113,182	113,705	19,724	133,429
1898	98,062	17,748	115,811	115,883	20,638	136,520
1899	100,031	18,911	118,942	118,209	21,990	140,199
1900	101,988	20,295	122,283	120,522	23,599	144,121
1901	103,982	21,831	125,812	122,878	25,385	148,262
1902	106,124	23,375	129,499	125,409	27,180	152,589
1903	108,184	24,822	133,006	127,844	28,862	156,707
1904	109,951	26,230	136,180	129,931	30,500	160,431
1905	111,513	27,641	139,153	131,777	32,140	163,917
1906	113,136	28,927	142,063	133,695	33,636	167,332
1907	114,697	30,007	144,704	135,540	34,892	170,432
1908	115,873	30,746	146,619	136,930	35,752	172,681
1909	116,806	31,330	148,136	138,033	36,430	174,463
1910	117,652	31,981	149,633	139,032	37,188	176,220
1911	118,337	32,640	150,977	139,841	37,953	177,795
1912	118,883	33,199	152,083	140,487	38,604	179,091
1913	119,427	33,673	153,100	141,130	39,155	180,284
1914	119,915	34,211	154,126	141,707	39,780	181,487
1915	119,829	34,476	154,304	141,605	40,088	181,693
1916	118,998	34,177	153,176	140,623	39,741	180,364
1917	117,865	33,761	151,627	139,285	39,257	178,542
1918	116,886	33,761	150,647	138,127	39,257	177,385
1919	116,556	34,430	150,986	137,737	40,035	177,772
1920	117,294	35,577	152,872	138,610	41,369	179,979
1921	118,387	37,204	155,591	139,901	43,260	183,161
1922	119,114	39,267	158,381	140,760	45,659	186,419
1923	119,856	41,265	161,121	141,637	47,983	189,620
1924	120,951	43,376	164,328	142,931	50,437	193,369
1925	122,633	45,793	168,427	144,919	53,248	198,167
1926	124,386	47,914	172,300	146,990	55,714	202,704
1927	125,885	49,935	175,820	148,762	58,064	206,826
1928	127,377	52,577	179,954	150,525	61,136	211,661
1929	129,128	55,623	184,751	152,594	64,678	217,272
1930	131,573	58,788	190,361	155,484	68,358	223,842
1931	133,957	61,964	195,921	158,301	72,051	230,352
1932	135,447	64,269	199,715	160,061	74,731	234,792
1933	136,334	65,056	201,390	161,109	75,646	236,756
1934	137,289	65,859	203,148	162,238	76,580	238,818
1935	138,619	67,342	205,961	163,809	78,305	242,114
1936	140,217	69,406	209,623	165,698	80,704	246,402
1937	142,330	72,076	214,407	168,195	83,810	252,005
1938	144,657	74,693	219,350	170,945	86,853	257,797
1939	147,126	76,756	223,883	173,863	89,252	263,115

Table 7e (cont.)

UK: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(Million 1990 Pounds)			(million 1990 Geary-Khamis $)		
1940	148,318	79,467	227,785	175,271	92,403	267,675
1941	147,287	82,231	229,519	174,053	95,618	269,671
1942	145,654	83,229	228,882	172,123	96,778	268,900
1943	143,787	82,770	226,557	169,916	96,244	266,161
1944	141,505	81,300	222,806	167,221	94,535	261,756
1945	137,388	78,171	215,560	162,355	90,897	253,252
1946	135,188	76,715	211,903	159,755	89,203	248,958
1947	136,904	79,577	216,481	161,783	92,532	254,314
1948	139,111	83,517	222,629	164,392	97,113	261,505
1949	141,807	87,642	229,449	167,577	101,910	269,486
1950	145,434	91,920	237,354	171,863	106,884	278,747
1951	149,552	96,253	245,805	176,730	111,923	288,652
1952	153,517	100,258	253,776	181,416	116,579	297,995
1953	157,901	104,143	262,045	186,596	121,097	307,693
1954	163,580	108,294	271,874	193,307	125,923	319,230
1955	170,911	113,506	284,417	201,970	131,984	333,954
1956	179,745	120,397	300,142	212,409	139,997	352,406
1957	189,557	129,143	318,700	224,005	150,166	374,171
1958	199,701	139,837	339,539	235,992	162,601	398,594
1959	209,142	151,571	360,713	247,149	176,245	423,394
1960	219,402	163,047	382,449	259,273	189,590	448,862
1961	232,216	173,551	405,767	274,415	201,804	476,219
1962	246,117	182,921	429,038	290,843	212,699	503,541
1963	259,790	191,217	451,007	307,000	222,346	529,346
1964	274,293	200,182	474,475	324,140	232,770	556,909
1965	290,804	210,373	501,177	343,650	244,620	588,270
1966	308,281	221,830	530,111	364,303	257,942	622,245
1967	326,947	234,402	561,349	386,362	272,561	658,922
1968	347,018	247,066	594,085	410,081	287,287	697,367
1969	367,070	258,746	625,815	433,776	300,867	734,643
1970	387,928	269,949	657,877	458,425	313,894	772,319
1971	410,527	280,721	691,247	485,130	326,419	811,549
1972	433,439	290,163	723,602	512,206	337,399	849,605
1973	456,016	299,956	755,972	538,886	348,786	887,672
1974	477,514	310,405	787,920	564,291	360,936	925,227
1975	498,131	318,955	817,086	588,654	370,878	959,532
1976	518,395	326,949	845,345	612,601	380,174	992,775
1977	537,508	336,131	873,639	635,187	390,851	1,026,037
1978	555,424	345,486	900,911	656,359	401,728	1,058,087
1979	573,917	355,563	929,480	678,212	413,445	1,091,658
1980	593,288	364,895	958,183	701,104	424,297	1,125,400
1981	612,250	370,735	982,986	723,512	431,087	1,154,599
1982	632,354	374,111	1,006,465	747,269	435,013	1,182,281
1983	654,332	378,128	1,032,460	773,241	439,683	1,212,925
1984	677,561	384,039	1,061,600	800,691	446,557	1,247,248
1985	700,308	393,050	1,093,357	827,572	457,034	1,284,606
1986	722,235	404,594	1,126,829	853,483	470,458	1,323,942
1987	746,482	416,461	1,162,943	882,137	484,257	1,366,394
1988	774,241	430,657	1,204,898	914,941	500,764	1,415,705
1989	804,086	450,619	1,254,705	950,209	523,976	1,474,185
1990	835,498	472,228	1,307,726	987,330	549,102	1,536,432
1991	867,486	488,710	1,356,197	1,025,131	568,268	1,593,399

Table 7f

USA: Gross Stock of Fixed Non-Residential Capital in 1990 Prices at Midyear

Year	Gross Stock of Non-Residential Structures	Gross Stock of Machinery and Equipment	Total Gross Non-Residential Capital Stock
	(million 1990 US$)		
1890	554,811	98,120	652,930
1891	581,630	100,171	681,801
1892	606,240	102,640	708,880
1893	630,305	105,416	735,721
1894	652,516	107,486	760,003
1895	674,295	108,813	783,108
1896	698,889	111,450	810,339
1897	727,006	114,016	841,022
1898	756,602	115,708	872,310
1899	787,785	119,173	906,958
1900	821,937	125,216	947,153
1901	858,859	131,974	990,832
1902	903,732	139,372	1,043,104
1903	955,856	148,819	1,104,674
1904	1,006,309	157,742	1,164,051
1905	1,052,355	166,468	1,218,823
1906	1,097,129	179,300	1,276,428
1907	1,144,931	196,131	1,341,062
1908	1,192,147	209,596	1,401,743
1909	1,236,948	218,865	1,455,812
1910	1,285,273	228,940	1,514,214
1911	1,334,914	239,522	1,574,436
1912	1,383,992	252,504	1,636,497
1913	1,434,437	268,359	1,702,796
1914	1,481,147	279,966	1,761,112
1915	1,521,509	286,427	1,807,936
1916	1,560,749	295,676	1,856,425
1917	1,597,759	310,459	1,908,219
1918	1,628,151	329,925	1,958,076
1919	1,656,709	348,081	2,004,790
1920	1,690,594	359,068	2,049,663
1921	1,724,916	362,168	2,087,084
1922	1,761,938	368,157	2,130,096
1923	1,810,124	386,088	2,196,212
1924	1,866,459	404,133	2,270,591
1925	1,926,503	420,813	2,347,316
1926	1,987,233	438,940	2,426,172
1927	2,049,487	451,559	2,501,046
1928	2,112,771	464,531	2,577,302
1929	2,174,926	485,301	2,660,227
1930	2,235,522	501,160	2,736,682
1931	2,285,266	499,005	2,784,272
1932	2,314,108	482,122	2,796,230
1933	2,327,677	461,374	2,789,051
1934	2,339,968	446,025	2,785,993
1935	2,354,055	440,714	2,794,769
1936	2,375,093	444,045	2,819,138
1937	2,404,966	446,989	2,851,956
1938	2,432,557	444,826	2,877,382
1939	2,459,316	440,140	2,899,456
1940	2,484,977	438,281	2,923,258
1941	2,508,931	448,161	2,957,091
1942	2,531,869	472,954	3,004,824
1943	2,538,743	511,343	3,050,086
1944	2,530,761	557,455	3,088,216
1945	2,522,821	610,347	3,133,169
1946	2,526,588	668,864	3,195,452
1947	2,543,146	736,514	3,279,660
1948	2,566,002	812,050	3,378,052
1949	2,591,536	875,941	3,467,477
1950	2,620,695	930,386	3,551,081
1951	2,658,250	985,605	3,643,855
1952	2,701,940	1,048,233	3,750,173
1953	2,758,111	1,117,880	3,875,991
1954	2,830,890	1,180,296	4,011,186
1955	2,910,861	1,233,434	4,144,295
1956	2,998,397	1,279,688	4,278,085
1957	3,098,349	1,309,743	4,408,093
1958	3,200,357	1,322,863	4,523,220
1959	3,293,465	1,335,407	4,628,872
1960	3,388,731	1,360,669	4,749,400
1961	3,491,483	1,382,686	4,874,169
1962	3,592,296	1,397,754	4,990,051
1963	3,694,714	1,427,915	5,122,629
1964	3,807,875	1,472,607	5,280,482
1965	3,934,062	1,529,449	5,463,510
1966	4,069,575	1,603,031	5,672,607
1967	4,208,297	1,681,563	5,889,860
1968	4,347,000	1,765,499	6,112,499
1969	4,488,452	1,859,394	6,347,847
1970	4,638,086	1,950,578	6,588,664
1971	4,802,265	2,037,060	6,839,326
1972	4,979,241	2,142,504	7,121,745
1973	5,163,463	2,280,228	7,443,690
1974	5,347,089	2,431,580	7,778,669
1975	5,508,789	2,568,874	8,077,664
1976	5,650,200	2,690,015	8,340,215
1977	5,791,755	2,822,551	8,614,306
1978	5,942,856	2,976,429	8,919,286
1979	6,114,925	3,134,464	9,249,388
1980	6,298,494	3,269,826	9,568,320
1981	6,486,419	3,387,035	9,873,454
1982	6,693,444	3,484,898	10,178,342
1983	6,904,958	3,562,727	10,467,685
1984	7,119,846	3,664,626	10,784,472
1985	7,348,410	3,804,318	11,152,729
1986	7,565,627	3,949,120	11,514,747
1987	7,762,728	4,067,936	11,830,664
1988	7,950,724	4,177,069	12,127,793
1989	8,138,481	4,321,616	12,460,097
1990	8,327,004	4,487,613	12,814,617
1991	8,500,883	4,621,782	13,122,665
1992	8,654,232	4,723,222	13,377,454

Table 8a
France: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 Francs)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment	Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1910	61,670			1950	82,908	60,693	143,602
1911	65,095			1951	79,622	64,241	143,862
1912	69,207			1952	70,916	61,245	132,161
1913	68,521			1953	68,725	61,955	130,680
1914	62,238			1954	70,224	66,210	136,434
1915	49,244			1955	76,969	76,182	153,150
1916	41,702			1956	83,138	85,601	168,739
1917	41,075			1957	90,807	96,399	187,206
1918	25,357			1958	96,457	99,788	196,245
1919	29,192			1959	107,412	110,705	218,117
1920	33,606			1960	116,291	121,622	237,914
1921	38,689			1961	134,221	138,688	272,910
1922	44,538			1962	147,770	153,428	301,197
1923	54,816			1963	157,629	165,960	323,589
1924	68,521			1964	177,289	180,188	357,477
1925	65,780			1965	193,260	186,218	379,478
1926	78,800			1966	217,417	205,332	422,748
1927	63,724			1967	236,386	215,264	451,650
1928	71,948			1968	242,727	234,024	476,752
1929	84,966			1969	260,774	273,829	534,604
1930	92,503			1970	279,915	290,185	570,101
1931	85,651			1971	282,333	321,384	603,717
1932	74,688			1972	299,668	348,116	647,784
1933	68,521			1973	298,568	382,558	681,125
1934	61,670			1974	298,109	378,913	677,022
1935	58,243	34,868	93,111	1975	299,860	355,533	655,393
1936	58,928	38,538	97,466	1976	302,138	394,967	697,105
1937	56,872	46,184	103,057	1977	294,059	393,477	687,535
1938	51,391	37,621	89,012	1978	291,826	401,940	693,766
1939	51,391	37,621	89,012	1979	305,646	419,256	724,902
1940	21,886	16,021	37,906	1980	308,928	446,522	755,449
1941	17,373	12,718	30,092	1981	307,817	435,069	742,886
1942	15,546	11,380	26,926	1982	307,549	436,675	744,223
1943	14,752	10,800	25,552	1983	293,915	421,472	715,387
1944	12,863	9,416	22,279	1984	290,242	412,409	702,651
1945	13,960	10,220	24,180	1985	294,816	448,277	743,092
1946	42,429	31,060	73,489	1986	315,086	473,505	788,591
1947	57,670	42,218	99,888	1987	328,384	506,965	835,348
1948	79,555	58,239	137,794	1988	361,980	566,252	928,232
1949	82,238	60,202	142,440	1989	379,388	617,549	996,938
				1990	401,624	639,632	1,041,256
				1991	413,510	616,075	1,029,584

Table 8b
Germany: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 DM)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1880	11,241		
1881	11,493		
1882	10,167		
1883	10,041		
1884	10,230		
1885	10,167		
1886	10,799		
1887	11,557		
1888	12,062		
1889	12,125		
1890	12,441		
1891	12,883		
1892	13,262		
1893	13,830		
1894	14,335		
1895	15,661		
1896	16,419		
1897	17,872		
1898	19,008		
1899	20,398		
1900	18,756		
1901	17,872		
1902	20,145		
1903	25,134		
1904	27,028		
1905	26,144		
1906	26,776		
1907	23,492		
1908	18,756		
1909	17,808		
1910	24,692		
1911	28,418		
1912	25,892		
1913	20,650		
1914	18,756		
1915	14,840		
1916	12,567		
1917	12,378		
1918	7,641		
1919	5,368		
1920	12,314	12,428	24,742
1921	19,387	14,800	34,188
1922	22,229	15,789	38,018
1923	16,167	13,416	29,583
1924	16,356	13,388	29,744
1925	17,998	15,026	33,024
1926	19,829	15,083	34,912
1927	23,555	17,794	41,350
1928	21,724	18,049	39,772
1929	20,903	16,100	37,003
1930	16,735	13,275	30,010
1931	12,504	9,208	21,712
1932	8,904	6,468	15,372
1933	13,198	7,852	21,051
1934	21,534	12,456	33,990
1935	24,818	14,800	39,619
1936	28,670	17,032	45,702
1937	31,702	19,941	51,643
1938	37,701	23,133	60,834
1939	35,364	24,404	59,768
1940	26,397	24,008	50,405
1941	22,671	24,517	47,188
1942	17,745	23,528	41,273
1943	13,009	20,562	33,571
1944	7,831	13,303	21,134
1945	6,883	5,593	12,476
1946	8,384	6,063	14,447
1947	10,942	7,938	18,880
1948	17,965	15,364	33,330
1949	25,260	23,253	48,514
1950	30,704	26,029	56,734
1951	29,988	28,540	58,528
1952	32,100	30,437	62,537
1953	38,726	33,278	72,004
1954	42,743	39,038	81,781
1955	53,205	48,650	101,855
1956	61,299	50,911	112,210
1957	62,161	49,525	111,686
1958	63,290	52,342	115,632
1959	73,338	58,444	131,782
1960	82,792	68,601	151,393
1961	88,091	76,569	164,659
1962	91,719	82,364	174,083
1963	95,267	82,641	177,907
1964	109,031	89,032	198,063
1965	112,302	95,785	208,087
1966	113,776	94,060	207,836
1967	99,379	86,007	185,385
1968	104,527	92,047	196,574
1969	116,299	111,380	227,679
1970	131,192	128,829	260,021
1971	136,133	134,581	270,714
1972	134,797	131,236	266,033
1973	132,528	130,629	263,157
1974	128,485	116,579	245,064
1975	122,058	116,440	238,498
1976	122,772	123,833	246,605
1977	122,104	133,654	255,758
1978	124,292	143,923	268,215
1979	129,568	156,781	286,348
1980	132,251	160,796	293,048
1981	125,571	153,265	278,836
1982	121,666	142,304	263,970
1983	118,821	150,879	269,700
1984	119,028	149,516	268,544
1985	117,404	163,012	280,417
1986	125,271	169,862	295,133
1987	126,642	178,160	304,802
1988	129,821	189,899	319,720
1989	134,923	206,878	341,802
1990	137,780	234,010	371,790
1991	143,159	255,272	398,431

Table 8c
Japan: Gross Investment in Non-Residential Structures and Machinery and Equipment (Billion 1990 Yen)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment	Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1885	97	48	146	1940	1,158	3,157	4,315
1886	93	53	146	1941	1,221	3,331	4,552
1887	96	59	156	1942	1,083	2,956	4,039
1888	108	81	189	1943	1,300	3,543	4,843
1889	121	72	193	1944	1,332	3,634	4,966
1890	135	82	217	1945	666	1,817	2,483
1891	159	98	257	1946	1,911	722	2,633
1892	134	87	221	1947	2,498	943	3,441
1893	136	107	243	1948	2,631	994	3,624
1894	151	149	300	1949	2,459	929	3,387
1895	157	144	301	1950	2,024	765	2,789
1896	195	177	371	1951	2,293	866	3,160
1897	264	188	452	1952	2,724	1,029	3,753
1898	266	187	453	1953	3,408	1,354	4,762
1899	255	115	370	1954	3,608	1,354	4,962
1900	264	135	399	1955	3,877	1,361	5,238
1901	275	126	401	1956	4,516	1,707	6,224
1902	276	105	381	1957	5,048	2,154	7,203
1903	300	121	420	1958	5,268	2,418	7,686
1904	221	156	377	1959	6,198	2,859	9,057
1905	276	266	542	1960	7,655	3,868	11,524
1906	340	250	590	1961	9,920	4,930	14,850
1907	369	261	630	1962	11,128	5,502	16,631
1908	412	311	723	1963	12,345	6,067	18,411
1909	425	270	695	1964	13,591	6,858	20,449
1910	571	288	859	1965	13,659	7,001	20,660
1911	747	369	1,116	1966	15,092	7,710	22,802
1912	522	415	938	1967	22,068	9,271	31,340
1913	497	444	942	1968	20,874	11,904	32,777
1914	529	415	944	1969	24,392	14,503	38,895
1915	443	366	810	1970	28,181	15,919	44,100
1916	431	479	910	1971	29,811	16,089	45,900
1917	488	772	1,260	1972	32,287	17,120	49,407
1918	553	1,126	1,678	1973	35,015	19,759	54,775
1919	542	1,208	1,750	1974	33,126	17,630	50,756
1920	819	1,212	2,031	1975	33,556	16,419	49,975
1921	804	929	1,733	1976	33,258	17,173	50,431
1922	891	741	1,632	1977	34,255	17,951	52,206
1923	762	575	1,338	1978	36,839	19,673	56,512
1924	1,029	614	1,644	1979	39,514	22,007	61,521
1925	1,145	604	1,749	1980	40,728	22,589	63,316
1926	1,295	657	1,952	1981	41,378	24,138	65,517
1927	1,361	700	2,061	1982	40,484	24,931	65,415
1928	1,241	732	1,974	1983	39,481	25,891	65,372
1929	1,313	802	2,115	1984	39,740	29,458	69,199
1930	1,257	809	2,066	1985	40,252	32,871	73,123
1931	1,192	601	1,793	1986	41,327	34,726	76,052
1932	1,089	620	1,709	1987	42,952	38,282	81,233
1933	1,172	784	1,956	1988	45,994	44,730	90,725
1934	1,257	1,077	2,335	1989	49,907	51,039	100,947
1935	1,481	1,272	2,754	1990	53,269	57,318	110,587
1936	1,487	1,427	2,913	1991	56,620	59,989	116,609
1937	1,531	1,448	2,979				
1938	1,547	1,988	3,535				
1939	1,782	2,755	4,537				

Table 8d
Netherlands: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 Guilders)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1910	5,633		
1911	5,624		
1912	6,097		
1913	6,379		
1914	6,097		
1915	6,379		
1916	6,620		
1917	6,088		
1918	5,633		
1919	7,132		
1920	7,422		
1921	7,895		
1922	6,878		
1923	6,632		
1924	6,668		
1925	6,792		
1926	7,899		
1927	8,627		
1928	9,542		
1929	10,624		
1930	11,676		
1931	12,541		
1932	11,108		
1933	9,816		
1934	9,843		
1935	9,446	2,961	12,407
1936	8,848	3,220	12,067
1937	8,949	4,271	13,220
1938	10,423	4,915	15,337
1939	11,071	4,988	16,059
1940	6,202	2,794	8,996
1941	4,451	2,005	6,456
1942	2,531	1,141	3,671
1943	2,011	906	2,917
1944	0	0	0
1945	0	0	0
1946	3,757	2,362	6,119
1947	8,020	5,041	13,061
1948	10,006	6,289	16,295
1949	10,553	6,737	17,291
1950	10,758	7,567	18,326
1951	10,842	7,114	17,955
1952	9,903	6,511	16,414
1953	13,283	7,397	20,680
1954	12,322	9,341	21,663
1955	14,337	11,312	25,649
1956	14,189	13,173	27,362
1957	14,231	13,973	28,205
1958	13,655	11,203	24,858
1959	15,590	12,536	28,126
1960	17,121	15,087	32,208
1961	18,409	16,261	34,670
1962	19,316	17,300	36,616
1963	20,178	17,281	37,459
1964	25,011	18,466	43,478
1965	25,101	19,525	44,626
1966	27,092	21,394	48,485
1967	30,157	22,028	52,185
1968	33,098	24,933	58,032
1969	31,656	23,107	54,764
1970	33,292	26,627	59,919
1971	34,043	25,707	59,750
1972	30,215	24,824	55,039
1973	28,967	28,430	57,397
1974	28,010	29,841	57,851
1975	28,264	27,891	56,155
1976	28,155	25,977	54,132
1977	27,792	29,976	57,767
1978	28,276	31,263	59,540
1979	27,743	32,097	59,841
1980	28,046	30,344	58,390
1981	24,787	27,179	51,966
1982	22,897	27,167	50,064
1983	21,492	29,890	51,382
1984	22,267	32,723	54,990
1985	24,060	42,720	66,780
1986	25,270	46,090	71,360
1987	25,840	46,640	72,480
1988	27,980	45,710	73,690
1989	29,030	49,440	78,470
1990	29,770	51,920	81,690
1991	30,680	53,620	84,300
1992	31,160	53,350	84,510

Table 8e

UK: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 pounds)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment	Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1780	324			1840	1,293	282	1,575
1781	324			1841	1,509	288	1,797
1782	328			1842	1,586	299	1,885
1783	334			1843	1,668	309	1,978
1784	339			1844	1,755	320	2,075
1785	345			1845	1,845	332	2,177
1786	352			1846	1,876	345	2,221
1787	362			1847	1,842	359	2,202
1788	373			1848	1,809	375	2,184
1789	383			1849	1,776	391	2,167
1790	393			1850	1,743	408	2,151
1791	419			1851	1,575	431	2,006
1792	430			1852	1,625	452	2,077
1793	442			1853	1,529	491	2,020
1794	455			1854	1,589	597	2,187
1795	466			1855	1,575	597	2,172
1796	475			1856	1,493	499	1,992
1797	479			1857	1,553	437	1,991
1798	483			1858	1,565	421	1,986
1799	488			1859	1,743	437	2,181
1800	492	96	588	1860	1,779	532	2,311
1801	482	98	580	1861	1,999	567	2,566
1802	486	100	586	1862	2,034	632	2,666
1803	490	102	592	1863	2,244	746	2,989
1804	495	103	598	1864	2,290	881	3,171
1805	499	104	603	1865	2,556	872	3,428
1806	505	107	612	1866	2,412	820	3,232
1807	512	108	620	1867	2,132	714	2,845
1808	519	109	628	1868	1,963	686	2,650
1809	526	110	637	1869	1,912	673	2,585
1810	534	113	646	1870	2,014	791	2,804
1811	542	110	652	1871	2,250	906	3,155
1812	549	113	662	1872	2,412	966	3,378
1813	557	114	670	1873	2,516	885	3,401
1814	565	115	680	1874	2,842	1,016	3,858
1815	572	117	690	1875	2,898	1,000	3,899
1816	583	120	702	1876	2,954	1,031	3,986
1817	594	123	717	1877	2,960	1,073	4,033
1818	606	128	734	1878	2,904	979	3,883
1819	617	132	749	1879	2,756	951	3,706
1820	629	136	765	1880	2,582	953	3,535
1821	626	142	768	1881	2,674	1,040	3,713
1822	637	147	784	1882	2,536	1,079	3,614
1823	650	153	803	1883	2,550	1,200	3,750
1824	662	158	819	1884	2,802	1,011	3,813
1825	675	162	837	1885	2,550	979	3,529
1826	695	168	863	1886	2,372	844	3,216
1827	723	174	898	1887	2,372	899	3,270
1828	754	181	935	1888	2,321	1,041	3,362
1829	785	188	974	1889	2,388	1,200	3,587
1830	817	196	1,013	1890	2,470	1,245	3,714
1831	859	204	1,063	1891	2,596	1,302	3,898
1832	895	212	1,107	1892	2,592	1,338	3,930
1833	932	219	1,151	1893	2,714	1,286	4,000
1834	969	228	1,197	1894	2,756	1,361	4,117
1835	1,010	237	1,247	1895	2,914	1,432	4,346
1836	1,057	245	1,303	1896	3,010	1,564	4,574
1837	1,112	254	1,365	1897	3,343	1,725	5,067
1838	1,169	263	1,433	1898	3,650	2,058	5,708
1839	1,230	273	1,502	1899	3,809	2,258	6,067

Table 8e (cont.)
UK: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 pounds)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment	Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1900	3,885	2,333	6,218	1950	7,138	10,541	17,679
1901	4,135	2,481	6,616	1951	6,937	11,024	17,961
1902	4,427	2,546	6,973	1952	7,246	10,328	17,575
1903	4,227	2,588	6,815	1953	8,036	10,600	18,636
1904	4,151	2,673	6,824	1954	8,831	11,829	20,660
1905	3,941	2,694	6,635	1955	9,956	12,984	22,940
1906	3,849	2,519	6,368	1956	11,202	13,356	24,557
1907	3,369	2,265	5,634	1957	12,013	14,339	26,351
1908	2,858	1,860	4,718	1958	12,815	14,636	27,451
1909	2,934	2,099	5,033	1959	12,597	15,372	27,969
1910	3,020	2,200	5,221	1960	15,094	16,655	31,748
1911	3,010	2,405	5,416	1961	16,880	18,109	34,989
1912	3,010	2,496	5,507	1962	17,553	17,351	34,904
1913	3,435	2,767	6,201	1963	17,109	18,165	35,274
1914	3,282	2,899	6,182	1964	19,935	20,327	40,262
1915	2,398	2,444	4,842	1965	21,087	21,619	42,706
1916	1,855	1,987	3,842	1966	21,327	22,648	43,975
1917	1,743	2,315	4,058	1967	23,469	23,424	46,892
1918	1,958	2,946	4,903	1968	24,783	24,334	49,117
1919	2,720	3,759	6,479	1969	24,976	23,837	48,813
1920	4,013	3,749	7,762	1970	26,397	24,909	51,306
1921	3,381	4,288	7,669	1971	26,836	24,329	51,165
1922	3,159	3,964	7,122	1972	26,494	26,065	52,558
1923	3,678	3,991	7,669	1973	26,494	26,065	52,558
1924	3,865	4,531	8,395	1974	24,828	26,861	51,689
1925	4,421	4,909	9,330	1975	25,668	25,002	50,670
1926	3,827	4,234	8,062	1976	25,746	26,446	52,192
1927	3,865	5,071	8,936	1977	24,227	27,434	51,661
1928	3,827	5,880	9,707	1978	23,890	29,768	53,658
1929	4,532	5,556	10,088	1979	23,157	32,333	55,490
1930	5,424	5,205	10,629	1980	21,891	30,599	52,490
1931	4,532	5,448	9,980	1981	21,260	27,153	48,412
1932	3,753	4,423	8,175	1982	23,450	27,357	50,807
1933	3,492	3,856	7,348	1983	23,931	28,848	52,778
1934	4,088	5,258	9,346	1984	26,133	31,720	57,853
1935	4,496	5,744	10,241	1985	26,166	35,539	61,705
1936	5,053	6,635	11,687	1986	27,164	35,409	62,573
1937	6,167	6,662	12,829	1987	31,361	37,920	69,281
1938	5,945	7,093	13,038	1988	35,328	43,397	78,725
1939	6,688	6,472	13,160	1989	37,466	48,390	85,857
1940	3,715	8,092	11,807	1990	39,434	46,276	85,710
1941	2,786	6,743	9,529	1991	38,725	40,569	79,294
1942	2,600	6,203	8,804				
1943	2,044	4,315	6,359				
1944	1,486	3,506	4,992				
1945	2,162	3,140	5,303				
1946	4,644	5,934	10,578				
1947	4,830	7,821	12,651				
1948	5,202	8,900	14,102				
1949	5,966	10,023	15,989				

Table 8f: USA: Gross Investment in Non-Residential Structures and Machinery and Equipment (million 1990 US$)

Year	Gross Investment in Non-Residential Structures	Gross Investment in Machinery and Equipment	Total Gross Non-Residential Investment
1850	6,304		
1851	6,463		
1852	8,009		
1853	7,930		
1854	9,843		
1855	8,941		
1856	7,200		
1857	8,556		
1858	8,708		
1859	7,863		
1860	7,158		
1861	7,035		
1862	6,242		
1863	3,359		
1864	5,488		
1865	5,334		
1866	6,498		
1867	8,328		
1868	8,799		
1869	11,878		
1870	16,510		
1871	16,571		
1872	19,260		
1873	17,457		
1874	15,144		
1875	13,176	6,169	19,346
1876	13,444	6,169	19,614
1877	13,941	6,169	20,110
1878	15,954	6,056	22,010
1879	14,818	6,190	21,008
1880	16,974	6,441	23,416
1881	27,849	7,627	35,476
1882	27,951	7,647	35,599
1883	23,897	7,164	31,061
1884	22,216	7,032	29,248
1885	18,490	6,651	25,141
1886	17,505	6,717	24,222
1887	27,871	7,689	35,560
1888	28,469	7,664	36,133
1889	29,099	8,023	37,122
1890	35,626	7,925	43,551
1891	32,484	8,517	41,000
1892	32,676	8,646	41,322
1893	33,226	9,154	42,380
1894	29,982	7,617	37,599
1895	29,717	9,106	38,822
1896	35,227	11,443	46,670
1897	38,270	8,500	46,771
1898	37,493	9,080	46,573
1899	39,895	11,533	51,427
1900	42,601	13,922	56,523
1901	44,520	14,000	58,520
1902	54,828	16,150	70,978
1903	58,267	18,431	76,698
1904	53,461	15,364	68,824
1905	50,462	18,531	68,993
1906	53,913	24,294	78,207
1907	58,820	27,167	85,987
1908	56,289	16,534	72,823
1909	61,700	18,726	80,426
1910	68,031	21,975	90,006
1911	67,082	19,132	86,214
1912	67,791	24,413	92,204
1913	65,698	27,910	93,608
1914	56,042	20,758	76,800
1915	51,304	20,086	71,390
1916	54,561	28,563	83,124
1917	49,354	35,584	84,939
1918	42,201	37,141	79,342
1919	46,707	33,066	79,773
1920	65,888	31,734	97,621
1921	58,556	25,927	84,483
1922	67,337	29,753	97,090
1923	75,148	41,368	116,517
1924	78,227	35,421	113,648
1925	77,856	39,047	116,903
1926	88,980	40,751	129,731
1927	91,870	36,810	128,680
1928	92,266	37,801	130,067
1929	96,768	44,583	141,351
1930	92,534	35,784	128,318
1931	72,115	24,054	96,169
1932	51,471	14,904	66,375
1933	38,875	13,808	52,683
1934	45,405	20,293	65,698
1935	47,713	26,745	74,458
1936	67,861	35,596	103,457
1937	67,648	41,416	109,064
1938	64,919	31,047	95,966
1939	71,095	34,049	105,144
1940	67,349	42,030	109,378
1941	79,906	55,291	135,197
1942	79,067	68,908	147,976
1943	46,407	90,254	136,661
1944	41,552	82,337	123,889
1945	46,943	83,284	130,227
1946	73,322	72,707	146,030
1947	74,902	91,305	166,207
1948	88,799	93,870	182,668
1949	92,000	80,950	172,951
1950	101,431	90,281	191,713
1951	108,553	97,167	205,719
1952	112,317	100,552	212,869
1953	121,765	103,837	225,602
1954	131,137	97,075	228,213
1955	134,670	106,521	241,191
1956	144,319	110,186	254,505
1957	147,141	109,086	256,227
1958	145,783	89,744	235,527
1959	153,028	100,966	253,994
1960	161,948	105,549	267,496
1961	169,449	102,498	271,947
1962	174,663	112,814	287,477
1963	183,549	122,327	305,875
1964	198,857	138,289	337,145
1965	220,352	162,843	383,195
1966	231,525	182,041	413,566
1967	230,054	179,412	409,466
1968	236,386	189,372	425,758
1969	235,820	202,016	437,835
1970	228,097	197,058	425,155
1971	223,848	195,178	419,026
1972	220,449	214,539	434,988
1973	232,274	251,619	483,893
1974	228,097	257,601	485,699
1975	210,878	225,032	435,910
1976	207,453	232,562	440,014
1977	208,225	267,651	475,876
1978	229,992	300,721	530,713
1979	252,588	316,479	569,067
1980	261,804	299,130	560,935
1981	273,020	296,739	569,759
1982	266,505	267,772	534,276
1983	244,482	279,273	523,755
1984	273,789	323,599	597,388
1985	303,604	348,023	651,628
1986	279,055	351,298	630,352
1987	278,848	352,492	631,340
1988	277,943	374,995	652,937
1989	291,003	396,733	687,737
1990	296,027	392,854	688,881
1991	272,601	375,697	648,298
1992	268,178	395,555	663,734

Papers issued in the sub-series of the Groningen Growth and Development Centre:

536 (GD-1) Maddison, Angus and Harry van Ooststroom, The International Comparison of Value Added, Productivity and Purchasing Power Parities in Agriculture (1993)

537 (GD-2) Mulder, Nanno and Angus Maddison, The International Comparison of Performance in Distribution: Value Added, Labour Productivity and PPPs in Mexican and US Wholesale and Retail Trade 1975/7 (1993)

538 (GD-3) Szirmai, Adam, Comparative Performance in Indonesian Manufacturing, 1975-90 (1993)

549 (GD-4) de Jong, Herman J., Prices, Real Value Added and Productivity in Dutch Manufacturing, 1921-1960 (1993)

550 (GD-5) Beintema, Nienke and Bart van Ark, Comparative Productivity in East and West German Manufacturing before Reunification (1993)

567 (GD-6) Maddison, Angus and Bart van Ark, The International Comparison of Real Product and Productivity (1994)

568 (GD-7) de Jong, Gjalt, An International Comparison of Real Output and Labour Productivity in Manufacturing in Ecuador and the United States, 1980

569 (GD-8) van Ark, Bart and Angus Maddison, An International Comparison of Real Output, Purchasing Power and Labour Productivity in Manufacturing Industries: Brazil, Mexico and the USA in 1975 (1994) (second edition)

570 (GD-9) Maddison, Angus, Standardised Estimates of Fixed Capital Stock: A Six Country Comparison (1994)

Groningen Growth and Development Centre Research Monographs:

No. 1 van Ark, Bart, International Comparisons of Output and Productivity: Manufacturing Productivity Performance of Ten Countries from 1950 to 1990 (1993)

No. 2 Pilat, Dirk, The Economics of Catch-Up: The Experience of Japan and Korea (1993)